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Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

NSTS 08126
REVISION H
NOVEMBER 22, 2000

REPLACES
NSTS 08126
REVISION G

SPACE SHUTTLE

PROBLEM REPORTING AND CORRECTIVE ACTION (PRACA) SYSTEM REQUIREMENTS

REVISION LOG

REV LTR	CHANGE NO	DESCRIPTION	DATE
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H	22	REVISION H (Reference: Space Shuttle PRCBD S061489AR1, dated 10/20/00) also includes Changes 18 thru 21.	11/22/00

CHANGE SHEET

FOR

NSTS 08126 - Space Shuttle
Problem Reporting and Corrective Action (PRACA)
System Requirements

REVISION H - CHANGE NO. 22

Program Requirements Control Board Directive No. S061489AR1/(1-1), dated
10/20/00.(1)

November 22, 2000

Robert H. Heselmeyer
Secretary, Program Requirements
Control Board

CHANGE INSTRUCTIONS

1. This is Revision H to NSTS 08126 dated November 22, 2000, which replaces Revision G dated February 8, 1996. Please discard Revision G to NSTS 08126 and utilize this Revision H in its place.
2. This Revision H includes the contents of NSTS 08126, Revision G as amended by Changes 18 thru 21 and this Change 22.
3. Subsequent changes to NSTS 08126 will be processed against this Revision H.

Signature of person incorporating changes

Date

NSTS 08126 - Space Shuttle
Problem Reporting and Corrective Action (PRACA)
System Requirements

LIST OF EFFECTIVE PAGES

November 22, 2000

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<u>Page No.</u>	<u>Change No.</u>	<u>PRCBD No.</u>	<u>Date</u>
i - viii	Rev. H	S061489AR1	October 20, 2000
1-1 - 1-2	Rev. H	S061489AR1	October 20, 2000
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7-1 - 7-2	Rev. H	S061489AR1	October 20, 2000
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B-1 - B-24	Rev. H	S061489AR1	October 20, 2000
C-1 - C-8	Rev. H	S061489AR1	October 20, 2000

SPACE SHUTTLE

**PROBLEM REPORTING AND
CORRECTIVE ACTION (PRACA)
SYSTEM REQUIREMENTS**

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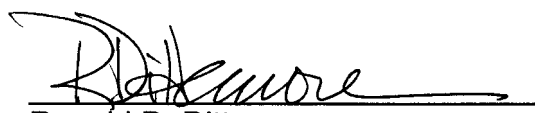
FOREWORD

Efficient management of the Space Shuttle Program (SSP) dictates that effective control of program activities be established. Requirements, directives, procedures, interface agreements, and system capabilities shall be documented, baselined, and subsequently controlled by SSP management.

Program requirements controlled by the Director, Space Shuttle Operations, are documented in, attached to, or referenced from Volume I through XVIII of NSTS 07700.

Deficiencies in Space Shuttle hardware and software are resolved and documented through the use of an organized system of problem reporting, analysis, disposition, and resolution. This document establishes requirements for problem reporting and corrective action for problems that occur on Space Shuttle hardware and software. These requirements supplement NSTS 5300.4(1D-2).

All elements of the SSP must adhere to these baselined requirements. When it is considered by the Space Shuttle Program element/project managers to be in the best interest of the SSP to change, waive or deviate from these requirements, an SSP Change Request (CR) shall be submitted to the Program Requirements Control Board (PRCB) Secretary. The CR must include a complete description of the change, waiver or deviation and the rationale to justify its consideration. All such requests will be processed in accordance with NSTS 07700, Volume IV - Book 1 and dispositioned by the Manager, Space Shuttle Program, on a Space Shuttle PRCB Directive (PRCBD).



Ronald D. Dittmore
Manager, Space Shuttle Program

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CONTENTS

NSTS 08126

1.0	INTRODUCTION	1-1
1.1	SCOPE	1-1
1.2	APPLICABILITY	1-1
2.0	APPLICABLE DOCUMENTS	2-1
3.0	PROBLEM REPORTING REQUIREMENTS	3-1
3.1	REPORTING CRITERIA AND REPORTABLE PROBLEM DEFINITION	3-1
3.2	TIMING OF PROBLEM NOTIFICATION	3-2
3.3	PROBLEM REPORTING RESPONSIBILITY	3-2
3.4	ADDITIONAL REQUIREMENTS FOR IN-FLIGHT ANOMALY (IFA) REPORTING	3-2
	3.4.1 IFA Numbering	3-3
3.5	PROCESS ESCAPES	3-4
3.6	DATA REQUIREMENTS FOR PRACA PROBLEM REPORTS	3-4
4.0	PROBLEM PROCESSING, DISPOSITION, AND RESOLUTION	4-1
4.1	IN-FAMILY/OUT-OF-FAMILY SCREENING AND DISPOSITION	4-1
4.2	REMEDIAL ACTION	4-1
4.3	INTERIM DISPOSITION	4-2
4.4	PROBLEM CAUSE DETERMINATION	4-2
4.5	PROBLEM DISPOSITION AUTHORITY	4-2
4.6	DOCUMENTATION REQUIREMENTS FOR PROBLEM DISPOSITION	4-3
5.0	PROBLEM TRENDING	5-1
6.0	DATA SYSTEM REQUIREMENTS	6-1
7.0	ORGANIZATIONAL RESPONSIBILITY	7-1
7.1	SSP OFFICE	7-1
7.2	SSP SR&QA OFFICE	7-1
7.3	SSP ELEMENT/PROJECT OFFICES	7-1
7.4	SSP ELEMENT/PROJECT SR&QA OFFICES	7-2

APPENDICES

NSTS 08126

A	ACRONYMS AND ABBREVIATIONS	A-1
B	PRACA DATA ELEMENTS AND DATABASE CODE TRANSLATION TABLES	B-1
C	GLOSSARY OF TERMS	C-1

FIGURES

NSTS 08126

B.1.1	FLIGHT SOFTWARE PRACA DATA ELEMENTS	B-5
B.1.2	HARDWARE PRACA DATA ELEMENTS	B-7
B.1.3	KSC CAAR DATA ELEMENTS	B-11
B.2	DATABASE CODE TRANSLATION TABLES	B-12

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1.0 INTRODUCTION

The goal of the Problem Reporting and Corrective Action (PRACA) system is to establish a process to continuously improve the safety and reliability of Space Shuttle hardware, software, and Ground Support Equipment (GSE). The PRACA system will provide the Space Shuttle Program (SSP) and all SSP elements/projects:

- a. Accurate and immediate visibility into problems.
- b. An accurate historical database to support problem trend analysis, provide failure history, support anomaly investigation, and to document corrective actions.

PRACA is only as accurate as the reported information. Therefore, sufficient attention must be paid to ensuring accuracy of the Problem Report (PR), failure summary, root cause analysis, in-family/out-of-family screening, and the incorporation of appropriate corrective action to prevent failure reoccurrence.

1.1 SCOPE

This document defines program requirements for problem reporting, analysis, disposition, resolution, and trending. Problems documented in PRACA include: Space Shuttle hardware (Orbiter, Government Furnished Equipment [GFE], flight crew equipment, Space Shuttle Main Engine [SSME], External Tank [ET], Solid Rocket Booster [SRB], Reusable Solid Rocket Motor [RSRM], and cargo integration hardware), Orbiter software discrepancies, SSME software discrepancies, Launch Processing System (LPS), GSE and Launch and Landing (L&L) facilities that support mission-to-mission processing of flight hardware. Objectives of this document are to establish:

- a. Uniform criteria for reporting problems.
- b. Requirements for problem disposition and closure.
- c. Requirements for documentation of corrective action.
- d. Requirements for problem documentation to support engineering and trend analysis.
- e. Requirements to support logistics management.
- f. Definition of PR data elements and terminology.

The terminology defined in Appendix B of this document will be used in preparing PRACA documentation and PRs.

1.2 APPLICABILITY

The SSP, all SSP elements/projects, contractors, subcontractors, and vendors must adhere to these requirements. SSP element/project offices are responsible for

reporting problems in the SSP PRACA system, an application of the SSP Web-based Program Compliance Assurance and Status System (WEBPCASS). PRACA process is maintained from the start of qualification testing through the hardware/software life cycle (excludes hardware modifications not currently certified).

All design element PRACA reportable problems must be dispositioned prior to flight.

2.0 APPLICABLE DOCUMENTS

The following documents of the date and issue shown form a part of this document to the extent specified herein. “(Current Issue)” is shown in place of a specific date and issue when the document is under Space Shuttle PRCB control. The current status of documents shown with “(Current Issue)” may be determined from NSTS 08102, Program Document Description and Status Report.

NSTS 07700 Volumes I - XVIII (Current Issue)	Program Definition and Requirements Ref. Foreword
NSTS 07700 Volume IV - Book 1 (Current Issue)	Configuration Management Requirements, Requirements Ref. Foreword
NSTS 08151 (Current Issue)	Intermediate and Depot Maintenance Requirements Document (IDMRD) Ref. Apx. C
NSTS 08170 (Current Issue)	Subsystem Codes Ref. Apx. B
NSTS 08171 (Current Issue)	Operations and Maintenance Requirements and Specifications Document Ref. Apx. B, C
NSTS 22206 (Current Issue)	Requirements for Preparation and Approval of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL) Ref. Apx. B, C

NSTS 37325
(Current Issue)

JSC Orbiter Problem Reporting and Corrective
Action (PRACA) Requirements

Ref. Apx. B

NSTS 5300.4(1D-2)
(Current Issue)

Safety, Reliability, Maintainability and Quality
Provisions for the Space Shuttle Program

Ref. Foreword

JSC 28035

Johnson Space Center (JSC) Government
Furnished Equipment (GFE) Problem Reporting
and Corrective Action (PRACA) Requirements

Ref. Apx. B

3.0 PROBLEM REPORTING REQUIREMENTS

3.1 REPORTING CRITERIA AND REPORTABLE PROBLEM DEFINITION

All nonconformances and anomalies on flight or flight-like hardware, Flight Software (FSW), SSME software, LPS, L&L facilities, and GSE shall be documented and dispositioned in the detecting organization's PRACA or equivalent nonconformance database. All nonconformances and anomalies will be screened to determine whether they are reportable to the appropriate design element PRACA database.

All nonconformances and anomalies initiated during KSC mission-to-mission processing will be provided to the SSP PRACA database.

Nonconformances, NASA Acute Launch Emergency Reliability Tips (ALERTs), or anomalies that meet the criteria below are defined as reportable and entered in the design element PRACA database.

- a. All nonconformances and anomalies that occur on flight or flight-like hardware which affect functional capability, or result in overstress, an unsatisfactory condition, or an unexplained anomaly.
- b. Orbiter FSW discrepancies (post release for flight).
- c. SSME software discrepancies.
- d. Nonconformances on LPS, L&L facilities, and GSE that meet the design element's criteria for reportable, as defined in design element's requirements.
- e. Failures of Critical Items List (CIL) hardware that fail in critical failure modes.

A reportable problem occurs or is detected from qualification testing through the hardware/software life cycle including:

- a. Qualification/certification testing (excludes hardware modifications not currently certified).
- b. Acceptance testing.
- c. In-flight/on-orbit.
- d. Turnaround operations including ground test, overhaul, and repair.
- e. Shipping and receiving of flight or flight-like hardware delivered to the government.
- f. When the nonconformance evaluation shows previously accepted/delivered flight or flight-like hardware requires a design change.

Material Review Board (MRB) nonconformances and dispositions may be entered into the design element PRACA at the discretion of the Design Element Office. No further problem resolution, as PRACA reportable problems, is required for MRB nonconformances.

3.2 TIMING OF PROBLEM NOTIFICATION

Nonconformances and anomalies shall be documented the day of occurrence or detection by the discovering organization and accessible to the applicable design element within one working day. If the problem is reportable, it will be entered into the design element PRACA database within five working days of isolation to the Line Replaceable Unit (LRU). If the problem is not isolated to a specific LRU within twenty one calendar days of occurrence/detection, the problem will be entered into the design element PRACA database.

Reportable problems experienced after the SSP Flight Readiness Review (FRR) through completion of the element's mission phase or during a flight which could potentially affect flight, ground crew safety, or mission success will be reported to the appropriate Design Element Office as soon as possible but no later than one working day from detection. If the problem occurs preflight, it must be reported to the Design Element Office prior to launch. Design Element Office managers are responsible for reporting significant problems to the Program Requirements Control Board (PRCB) or Mission Management Team (MMT) to support launch or flight decisions.

3.3 PROBLEM REPORTING RESPONSIBILITY

The SSP elements/projects, contractors, subcontractors, and vendors are responsible for documenting nonconformances and anomalies that occur during their operations. Design Element Offices are responsible for transferring PRACA reportable problems into their design element PRACA database and ensuring the reports are accurate and complete.

3.4 ADDITIONAL REQUIREMENTS FOR IN-FLIGHT ANOMALY (IFA) REPORTING

IFAs are defined as any PRACA reportable problems occurring on flight hardware or software from cryogenic tanking (approximately T-6 hours) through the end of each element's mission phase that meet one of the following criteria:

- a. Problem that affects a Criticality 1, 1R, 1S, 2, or 2R function or presents a flight hazard.
- b. Orbiter FSW discrepancy.
- c. SSME software discrepancy.

- d. Problem that caused a significant unplanned operational work around.
- e. Problem that did or could cause an extended countdown hold, launch scrub, or abort.
- f. Problem that did or could affect safety or mission success.
- g. Problem that may cause a significant impact on SSP resources, logistics, or schedules.
- h. Any anomaly recommended by the responsible Design Element Office.

IFAs shall be identified by the Design Element/Project Offices and reported to the PRCB. The IFAs will be presented to the PRCB no later than two days prior to the SSP FRR for the next flight or within fourteen working days of landing, whichever comes first. For missions scheduled too close together to meet this requirement, the IFA report to the SSP must support the prelaunch MMT meeting for the upcoming flight.

A PRCB directive is written to document program IFAs, actions levied by the PRCB, and constraints to subsequent flights.

Responsibility for IFA processing and dispositioning remains with the respective Design Element Office. The method for documenting IFAs in PRACA is the same as any other PRACA reportable problem (reference Paragraph 3.6 and Paragraph 4.3).

3.4.1 IFA Numbering

Unique IFA tracking numbers are assigned by Element/Project Office using the following format: STS-XXXX-Y-ZZZ where XXXX is the mission number, ZZZ is the anomaly number, and Y designates the Element/Project Office as follows:

V - Space Shuttle Vehicle Engineering Office

B - SRB

M - RSRM

E - SSME

T - ET

K - Shuttle Processing

I - Space Shuttle Integration

P - Payloads

L - Life Sciences

D - Mission Operations Directorate

G - GSFC/network

X - Extravehicular Activity (EVA)

R - ESMC/Range

3.5 PROCESS ESCAPES

If a PRACA reportable problem is found after it should have been detected during normal processing and is not a process catch, the report must indicate the problem as a “process escape”.

Normal processing is defined as activity performed in accordance with approved procedures (e.g., Work Authorization Document [WAD]). A process catch is defined as a problem found during normal processing (departing from procedure), inspection, or surveillance sampling prior to or during closeout or test. A process escape is defined as any problem found after it should have been detected during normal processing. Escapes include problems found during surveillance sampling, inspection (including random), or audit after closeout or test. Also, if an assessment determines that the problem would not have been caught during closeout or test, the problem will be considered a process escape.

The elements and projects will report process escapes at the SSP quarterly Preventive/Corrective Action Review PRCB.

3.6 DATA REQUIREMENTS FOR PRACA PROBLEM REPORTS

Nonconformances and anomalies will be documented using the data elements specified in Appendix B. Hardware nonconformances will be reported to the lowest level end item, LRU, or component. All elements that must be completed at report initiation and closure are designated in Appendix B. Reference Paragraph 4.6 for documentation requirements for problem disposition.

4.0 PROBLEM PROCESSING, DISPOSITION, AND RESOLUTION

All design element PRACA reportable problems must be interim dispositioned or closed prior to flight. Processes for in-family/out-of-family screening, determination of problem cause, assessment of risk, fault isolation techniques, implementation of remedial or corrective action, and verification of action effectiveness are defined and documented in the design element's PRACA procedures.

Section 4 does not apply to all KSC nonconformances. However, KSC nonconformances on hardware or software that support the upcoming mission (e.g., nonconformance on launch pad in use, MRB nonconformance on flight vehicle, etc.) must be interim dispositioned or closed prior to flight.

4.1 IN-FAMILY/OUT-OF-FAMILY SCREENING AND DISPOSITION

The Design Element Offices are responsible for defining their in-family/out-of-family screening criteria consistent with the definitions in Appendix C.

Nonconformances meeting the in-family criteria are dispositioned or reclassified in one of the following ways:

- a. Final closure with remedial action (such as repair or return to print), corrective action, or no further actions.
- b. Interim disposition with supporting rationale.
- c. If any evidence uncovered during Test, Teardown Evaluation (TTE) indicates a different cause than presumed, the problem requires reclassification to out-of-family and subsequent dispositioning.

Out-of-family problems are dispositioned in one of the following ways:

- a. Final closure with corrective action required.
- b. Final closure with no corrective action required or remedial action only.
- c. Interim disposition with supporting rationale.

4.2 REMEDIAL ACTION

The Design Element Offices are responsible for defining their remedial action screening criteria. A screen to determine whether remedial action is required will be performed based on risk, operational criticality, or performance thresholds. When performance different from specifications is accepted as the basis for not performing remedial action, consideration will be given to changing the specification requirement. Recurring remedial actions will be evaluated to determine whether corrective action is warranted.

Additional screening criteria are used to determine whether remedial action only is acceptable for final closure.

4.3 INTERIM DISPOSITION

In-family or out-of-family problems may be screened to determine if interim disposition is acceptable or if final closure is required prior to the next launch. Interim disposition is acceptable based on one of the following criteria:

- a. The problem is not applicable to the flight(s) (i.e., system not installed and/or used on the flight).
- b. The problem condition is clearly screened during preflight checkout or special tests.
- c. The problem is time/age/cycle related and the flight units will accumulate less than 50% of the critical parameter(s) by the end of the flight.
- d. There is no indication of a generic problem.
- e. There is no overall safety of flight concern.
- f. The problem is applicable to the flight(s) (system used during flight); however, the PRCB agrees that sufficient evidence exists that the system can be flown safely (acceptable risk).

4.4 PROBLEM CAUSE DETERMINATION

To determine the cause of the nonconformance or anomaly, fault tree analyses, TTE, and/or failure analyses methodologies shall be employed. The Design Element Offices are responsible for defining and documenting the requirements for TTE and failure investigation.

When failure investigation is not required, the nonconforming parts, all removed piece parts, components, or assemblies shall be preserved when appropriate. Preservation of the parts will allow failure investigation at a later date, if required, as a result of new evidence or adverse problem trends.

4.5 PROBLEM DISPOSITION AUTHORITY

Out-of-family problem closures require NASA approval. Approval by the Design Element Office's Certificate of Flight Readiness (CoFR) signature level authority is required for in-family and out-of-family problems that affect a Criticality 1, 1R, and 1S function. The CoFR signature level authority may delegate approval for closure of lower criticality problems.

4.6 DOCUMENTATION REQUIREMENTS FOR PROBLEM DISPOSITION

Nonconformances will be documented in the design element PRACA system using the data elements specified in Appendix B.

Required documentation for problem disposition is as follows:

- a. Closed Problem - Documentation must include the cause(s), remedial and/or corrective action (if required) or rationale for no corrective action required. If the problem is closed with no corrective action required, the consequences of the problem occurring in-service must also be documented.
- b. Unexplained Anomaly (problem cause can not be determined) - Documentation must include the probable cause and rationale for flight without a definitive cause.
- c. Interim Disposition - Documentation must include the cause (if known) or basis for deferral of cause determination, effectivity of the interim disposition, and the rationale for flight. (Reference Paragraph 4.3 for interim disposition criteria.)

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5.0 PROBLEM TRENDING

Design Element Offices are responsible for providing problem trend analysis and identifying hardware and/or software as candidates for review and further analysis based on failure recurrence, risk measure, and/or cost.

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6.0 DATA SYSTEM REQUIREMENTS

All KSC nonconformances and all design element PRACA reports shall be made available to the SSP WEBPCASS on a daily basis, except for planned outages. Requirements for the transfer of PRACA reports from the design element PRACA to SSP PRACA are defined in the Interface Definition Agreements (IDAs). The IDAs define data transfer, communication circuits, system availability, system security, data backup requirements, and auditing procedures.

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7.0 ORGANIZATIONAL RESPONSIBILITY

The SSP Office, SSP Safety, Reliability and Quality Assurance (SR&QA) Office, and all SSP Element and Project Offices are responsible for PRACA as follows.

7.1 SSP OFFICE

The SSP Office is responsible for PRCB decisions, as related to PRACA issues or accepted risks for problems. The SSP Safety and Mission Assurance Manager is responsible to:

- a. Establish and maintain SSP PRACA policies and requirements.
- b. Assure appropriate management reporting procedures are defined and implemented.
- c. Provide overall management for the SSP PRACA database.
- d. Provide PRACA data accessibility for independent assessment.
- e. Direct/participate in PRACA process audits to assure Element and Project Office compliance with these requirements.

7.2 SSP SR&QA OFFICE

The SSP SR&QA Office is the office of primary responsibility for this document. Responsibilities include:

- a. Provide technical advice and support to the Manager, SSP with regards to PRACA requirements and implementation.
- b. Assure PRACA requirements are maintained current with SSP policy.
- c. Direct/participate in PRACA process audits.
- d. Define SR&QA requirements for the SSP PRACA database.
- e. Advise the SSP Manager to the risk decisions related to problem resolutions and trends.

7.3 SSP ELEMENT/PROJECT OFFICES

Element and Project Offices are responsible to:

- a. Implement element PRACA systems consistent with the requirements in this document.

- b. Participate in PRACA process audits.
- c. Perform surveillance on selected PRACA reportable problems and/or processes to assure compliance with SSP requirements.
- d. Coordinate/integrate PRACA results for common hardware across other program elements.
- e. Disposition all problems prior to flight.
- f. Integrate PRACA results into other program operations including Launch Commit Criterion (LCC), flight rules, Failure Modes and Effects Analysis (FMEA)/CIL, hazard analyses, maintenance and logistics requirements, etc.
- g. Implement element PRACA data systems consistent with the requirements in this document.
- h. Assure SR&QA participation as an integral part of element PRACA activities.

7.4 SSP ELEMENT/PROJECT SR&QA OFFICES

Element SR&QA Offices must participate in Prevention Resolution Teams (PRTs). Additional responsibilities include:

- a. Concurrence on element PRACA requirements and procedures.
- b. Concurrence on element PRACA reportable problem criteria and problem screening criteria.
- c. Provide recommendations on out-of-family problem dispositions.
- d. Perform PRACA process audits.
- e. Verify PRACA results are coordinated with other risk management activities such as FMEA/CIL analyses, hazard analyses, and the program CA/PA process.

APPENDIX A

ACRONYMS AND ABBREVIATIONS

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APPENDIX A

ACRONYMS

ALERT	Acute Launch Emergency Reliability Tip
ATP	Acceptance Test Procedure
CAAR	Corrective Action Assistance Request
CIL	Critical Items List
CoFR	Certificate of Flight Readiness
CR	Change Request
DR	Discrepancy Report
EI	Externally Induced
EIM	End Item Model
ESD	Electronic Discharge
ET	External Tank
EVA	Extravehicular Activity
FMEA	Failure Modes and Effects Analysis
FRR	Flight Readiness Review
FSW	Flight Software
GFE	Government Furnished Equipment
GIDEP	Government/Industry Data Exchange Program
GSE	Ground Support Equipment
IDA	Interface Definition Agreement
IFA	In-flight Anomaly
L&L	Launch and Landing
LCC	Launch Commit Criteria
LPS	Launch Processing System
LRU	Line Replaceable Unit
MMT	Mission Management Team
MRB	Material Review Board
OMRSD	Operations and Maintenance Requirements and Specifications Document
PR	Problem Report
PRACA	Problem Reporting and Corrective Action

PRCB	Program Requirements Control Board
PRCBD	Program Requirements Control Board Directive
PRT	Prevention Resolution Team
RSRM	Redesigned Solid Rocket Motor Reusable Solid Rocket Motor
SAIL	Shuttle Avionics Integration Laboratory
SASCB	Shuttle Avionics Software Control Board
SR&QA	Safety, Reliability and Quality Assurance
SRB	Solid Rocket Booster
SRU	Shop Replaceable Unit
SSME	Space Shuttle Main Engine
SSP	Space Shuttle Program
TTE	Test, Teardown Evaluation
WAD	Work Authorization Document
WEBPCASS	Web-based Program Compliance Assurance and Status System

APPENDIX B

**PRACA DATA ELEMENTS AND DATABASE CODE TRANSLATION
TABLES**

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APPENDIX B

PRACA DATA ELEMENTS AND DATABASE CODE TRANSLATION TABLES

All SSP elements (KSC nonconformance system, GFE PRACA, Orbiter PRACA, MSFC PRACA, and Orbiter FSW) shall use the mandatory set of controlled data elements in Table B.1 to allow PR information to be exchanged between elements and WEBPCASS. Orbiter, GFE, and MSFC shall use the common database translation codes, as defined in Table B.2.

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TABLE B.1.1

FLIGHT SOFTWARE PRACA DATA ELEMENTS

Reference Number	Element Name	Definition
1	Discrepancy Report (DR) Number	This number should be a six digit number that is identical to the number on the associated DR form.
2	Origination Date	This date should be a six digit date reflecting the date at which the FSW DR management form was written, MM/DD/YY.
3	Revision Date	This date should be a six digit date reflecting the date at which the latest revision to the Shuttle Avionics Software Control Board (SASCB) DR management form revision was written, MM/DD/YY.
4	DR Title	The title should be identical to the title on the associated FSW DR form.
5	Process Escape	Classification of Process Escape. See Appendix C for definition of Process Escape.
6	Software Code	Severity Code: This code indicates the severity of the associated FSW DR. These DR codes are (1, 1N, 2, 2N, 3, 4, or 5) assigned by the contractor DR board.
7	Log Date	This date should be the six digit date reflecting the date that the associated FSW DR was logged into the contractor problem reporting database (CMDB for PASS, etc.), MM/DD/YY.
8	Description of Problem	This field should contain the number and the type of system failures and the requisite operational scenario that caused the software condition to occur. Also, there should be a brief understandable explanation of the associated discrepancy itself.
10	How User Sees Effects	This field summarizes the effects of the associated discrepancy on the Space Shuttle System and should explain how the external user (i.e., ground monitors or crew) would see these effects.
11	Requirement	This field identifies the requirements document and paragraphs where the FSW requirement violations, inadequacies, or references may be found which relate to the associated FSW DR.
12	Principal Functions Affected	All principal functions or functional areas to which the problem is believed to be applicable.
13	Cross References	Program Change Requests (CRs), DRs, or CRs that are related to the problem.
14	Disposition	FSW DR closure codes categorized by either the Space Shuttle flight number and or by the FSW OI (or MEDS VI) in which the associated discrepancy exists. Reference: Closure codes are defined in Appendix C of SCR 89052
15	SASCB Agenda Release Code	Indicates the earliest currently supported released system against which the DR is applicable.
16	Rationale for Disposition	Rationale for the disposition. Acceptability reasons for waivers and reasons behind the schedules for FSW DR fixes are important and should be included.
17	Contact	This field should indicate the responsible analyst and/or associated FSW DR form author.
18	SRE	This field should indicate the initials of the assigned ASO SRE (SASCB responsible engineer).
19	Author	Initiator of original DR.
20	Found by Organization	Reflects the organizational element where the associated DR was found. (Shuttle Avionics Integration Laboratory [SAIL], SMS, etc.)
22	SASCB Date	Date that the latest revision to the DR management form was dispositioned at the SASCB.

TABLE B.1.1**FLIGHT SOFTWARE PRACA DATA ELEMENTS - Concluded**

Reference Number	Element Name	Definition
23	Class	Classification of DR N FSW DR - Routine no-fix closure (3A, 4G, etc.) O FSW DR - Waiver (4A, 4B) - no fix planned P FSW DR - Waiver with future fix (2A, 2B) Q FSW DR - Fix (2A, 2B) ASAP - no waiver R FSW DR - Requirements issue (3C, 3D, 3F) S FSW DR - MEDS T TOOL DR U RECON DR
24	Remarks	Used to capture additional information including problems identified as out-of-family occurrences.

TABLE B.1.2

HARDWARE PRACA DATA ELEMENTS

Reference Number	Element Name	Definition	KSC	MSFC	PDSS	GFE
1	Report Number	Report number assigned by the design center, contractor, or KSC.	Yes	Yes	Yes	Yes
2	IFA Number	Official IFA report number assigned by SSP.	Yes	Yes	Yes	Yes
3	Mission Effectivity	STS or mission number, element code, and hardware effectivity.	Yes	Yes	Yes	Not Applicable
4	Project Element	SSP element. Reference: NSTS 08170, Subsystem Codes, element codes.	Yes	Yes	Yes	Yes
5	System	SSP subsystem codes - The subsystem to which the problem is assigned. Reference NSTS 08170.	Yes	Not Applicable	Yes	Yes
6	Date Detected	Date originally detected.	Yes	Yes	Yes	Yes
7	Closed Date	Date the applicable design center or Project Office approved problem resolution.	Yes	Yes	Yes	Yes
8	Location	Site at which the problem was detected or occurred. For tables, reference the following sources: JSC - Orbiter PRACA Requirements (NSTS 37325, JSC Orbiter Problem Reporting and Corrective Action [PRACA] Requirements) GFE - JSC GFE PRACA Requirements (JSC 28035, Johnson Space Center [JSC] Government Furnished Equipment [GFE] Problem Reporting and Corrective Action [PRACA] Requirements) KSC - PRACA SPI QA-001 or 002 MSFC - Operation Plan, Problem Assessment Center	Yes	Yes	Yes	Yes
9	Test/Operation	Test or activity at the time of problem detection. JSC - Orbiter PRACA requirements (NSTS-37325) GFE - JSC GFE PRACA requirements (JSC 28035) MSFC - NSTS 08126, Problem Reporting and Corrective Action (PRACA) System Requirements, Appendix A.2	Not Applicable	Yes	Yes	Yes
10	Detected During	The document type and number describing operation being performed.	Yes	Not Applicable	Yes	Yes
11	Contractor	Contractor/manufacture who built/supplied failed item/component. Reference CAGE codes.	Not Applicable	Yes	Yes	Yes
12	Problem Title	Problem title.	Not Applicable	Yes	Yes	Yes
13	Problem Description	Description of problem as first noted up-to date description of problem.	Yes	Yes	Yes	Yes

TABLE B.1.2

HARDWARE PRACA DATA ELEMENTS - Continued

Reference Number	Element Name	Definition	KSC	MSFC	PDSS	GFE
14	Part Number/Nomenclature/ Serial Number Classify as one or more: LRU Shop Replaceable Unit (SRU) NCA End Item Model (EIM)	The part number information of the element indenture levels affected by the problem. The part number, nomenclature and serial number must be supplied. KSC does not classify the part number, but does provide LRU/NCA part number when defective part is removed.	Yes	Yes	Yes	Yes
15	Hardware Criticality	Reference NSTS 22206, Requirements for Preparation and Approval of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)	Yes	Yes	Yes	Yes
16	Functional Criticality	Reference NSTS 22206	Yes	Yes	Yes	Yes
17	Worst Case Criticality	The worst-case criticality of the LRU or component based on NSTS FMEA/CIL failure modes.	Not Applicable	Not Applicable	Not Applicable	Not Applicable
18	Cause	The event or series of events ultimately responsible for the problem. Reference: JSC - Orbiter PRACA Requirements (NSTS 37325) GFE - JSC GFE PRACA Requirements (JSC 28035) KSC - PRACA Data Code Manual S000006-3 MSFC - NSTS 08126, Appendix A.2	Yes	Yes	Yes	Yes
19	Related Documents Related Document Type Related Document Number Related Document Names	Reference information to documents (waivers, ALERTs, etc.) associated with the identification or resolution of the problem. Documentation type, number, and name must be supplied.	Yes	Yes	Yes	Yes
20	Out-of-Family	Yes/No field designated whether problem is an out-of-family occurrence.	Yes	Yes	Yes	Yes
21	Responsible Organization or Person	Person or organization responsible for report.	Yes	Yes	Yes	Yes
22	Disposition Summary	The failure analysis and resolution of the problem and any action taken to correct the problem.	Yes	Yes	Yes	Yes
23	Subsystem	SSP element subsystem - The JSC subsystem to which the problem is assigned. Reference NSTS 08170.	Not Applicable	Yes	Yes	Yes
24	Orbiter Location	Location on the Orbiter where problem occurred.	Yes	Not Applicable	Yes	Not Applicable
25	Prevailing Condition	Environment type when detected. JSC - Orbiter PRACA Requirements (NSTS 37325) GFE - JSC GFE PRACA Requirements (JSC 28035) MSFC - NSTS 08126, Appendix A.2	Not Applicable	Yes	Yes	Yes

TABLE B.1.2

HARDWARE PRACA DATA ELEMENTS - Continued

Reference Number	Element Name	Definition	KSC	MSFC	PDSS	GFE
26	FMEA Number	The FMEA number which addresses the failure mode of failed elements/LRU/SRU (to lowest level possible).	Not Applicable	Yes	Yes	Yes
27	Failure Mode	A description of the manner in which an item failed. Reference: JSC - Orbiter PRACA Requirements (NSTS 37325) GFE - JSC GFE PRACA Requirements (JSC 28035) MSFC - NSTS 08126, Appendix A.2 KSC - PRACA Data Code Manual S000006-3	Yes	Yes	Yes	Yes
28	CIL Rationale	Yes/No indicator that tells whether a CIL is effected.	Not Applicable	Yes	Yes	Yes
29	Material Defect A - Defect	Defect - Indicates the defect that resulted in the failure. Reference: JSC - Orbiter PRACA Requirements (NSTS 37325) GFE - JSC GFE PRACA Requirements (JSC 28035) MSFC - NSTS 08126, Appendix A.2	Not Applicable	Yes	Yes	Yes
30	Material Defect B - Material	Material - Indicated the material that failed. Reference: JSC - Orbiter PRACA Requirements (NSTS 37325) GFE - JSC GFE PRACA Requirements (JSC 28035) MSFC - NSTS 08126, Appendix A.2	Not Applicable	Yes	Yes	Yes
31	Recurrence Control Code	Classification of the primary recurrence control actions. Reference: JSC - Orbiter PRACA Requirements (NSTS 37325) GFE - JSC GFE PRACA Requirements (JSC 28035) MSFC - NSTS 08126, Appendix A.2	Not Applicable	Yes	Yes	Yes
32	End-Item Control Number	An end-item control number is a sequential identifier contained in an implementing organization instruction's.	Yes	Yes	Not Applicable	Not Applicable
33	Date Isolated	Date that the problem was isolated.	Yes	Yes	Not Applicable	Not Applicable
34	Date/Time Updated	Date/time of latest status or update.	Yes	Yes	Yes	Yes
35	Contractor Resolution	Date the contractor submitted the full problem resolution.	Not Applicable	Yes	Yes	Yes
36	Expected date or Mission of Interim Disposition to	Date or mission that problem was interim dispositioned to.	Yes	Yes	Yes	Yes
37	Latest Interim Disposition Date	Date that last interim disposition occurred.	Yes	Yes	Yes	Yes

TABLE B.1.2**HARDWARE PRACA DATA ELEMENTS - Concluded**

Reference Number	Element Name	Definition	KSC	MSFC	PDSS	GFE
38	Process Escape	Classification of process escape. See Appendix C for definition of process escape.	Yes	Yes	Yes	Yes
39	Problem Status	Problem Resolution Status Valid Entries: O = Open C = Closed E = Explained D = Deferred V = Void N = Not a problem, not applicable	Yes	Yes	Yes	Yes

TABLE B.1.3
KSC CAAR DATA ELEMENTS

NSTS 08126 B.1 Ref	Element Name	Definition
1	Report Number	Report number assigned by the design center, contractor or KSC.
2	Mission Effectivity	STS or mission number, element code, and hardware effectivity
3	Project Element	SSP Element Applicable Data Codes: V = Orbiter E = SSME B = SRB R = RSRM T = Tank G = Mobile Support Equipment (KSC) F = Fixed Support Equipment (KSC)
4	Request Date	Date Corrective Action Assistance Request (CAAR) requested.
5	Closed Date	Date the applicable design center or Project Office approved problem resolution.
6	Problem Title	Problem title.
7	Part Number/Nomenclature/Serial Number Classify as one or more: LRU SRU NCA EIM	The part number information of the element indenture levels affected by the problem. The part number, nomenclature, and serial number must be supplied.
8	Cause	The event or series of events ultimately responsible for the problem.
9	Related Documents Related Document Type Related Document Number Related Document Names	Reference information to documents (waivers, ALERTs, etc.) associated with the identification or resolution of the problem. Documentation type, number, and name must be supplied.
10	Responsible Person	Person responsible for the disposition, analysis, of PRs.
11	Orbiter Location	Location on the Orbiter where problem occurred.
12	CIL Rationale	Yes/No indicator that tells whether a CIL is effected.
13	Recurrence Control Code	Classification of the primary recurrence control actions. Reference: KSC – PRACA SPI QA–001 or 002
14	CAAR Description	Description of corrective action request.
15	Date Isolated	Date that the problem was isolated.
16	Response Date	Actionee response date.
17	Verification of Action Date	Date corrective action verified.
18	Corrective Action Verification	Actions taken to verify implementation of corrective action.
19	Verification of Effectiveness Date	Date effectiveness of correction action verified.
20	Verification of Effectiveness	Actions taken to verify effectiveness of correction action.

TABLE B.2**DATABASE CODE TRANSLATION TABLES**

PRACA Code List for Test or Operation (Element 9)

<u>Code</u>	<u>Output</u>	<u>Definition</u>
A	ATP	Acceptance Test Procedure (ATP) (Obsolete code for JSC problems after 1981.)
AI	ATI	ATP, initial acceptance testing.
AS	ATS	ATP, not initial acceptance test.
D	DEV	Development test procedure.
F	FLT	Flight (24 hours before launch through post-landing inspections and routine refurbishment, including pre-ATP.)
L	FLD	Field detected prior to first flight of hardware (use LF or LL). (Obsolete code for JSC problems after 1981.)
LF	FDF	Field detected - NSTS 08171, Operations and Maintenance Requirements and Specifications Document, type testing prior to first flight of hardware.
LL	FDL	Field detected - Laboratory type testing/usage (SAIL, bench test, etc.) prior to first flight of hardware.
M	MFG	Manufacturing (includes pre-ATP, and overhaul) (Obsolete code for JSC problems after 1981.)
MI	MFI	Manufacturing (Initial build of hardware only, not routine refurbishment.)
MO	MAN	Maintenance/repair (All after initial manufacturing, including failure investigation/analysis.)
P	PFT	Field detected subsequent to first flight of hardware (use PF or PL). (Obsolete code for problems after 1981.)
PF	PFF	Field detected - OMRSD type testing subsequent to first flight of hardware.
PL	PFL	Field detected - Laboratory type testing/usage (SAIL, bench test, etc.) subsequent to first flight of hardware.
Q	QAL	Qualification or certification testing (wherever performed).
X	ALE	ALERT (NSTS problem identified through an ALERT.)
ZZ	ZZ	Not a reportable problem.

TABLE B.2

DATABASE CODE TRANSLATION TABLES - Continued

PRACA Code List for Prevailing Condition (Element 25)

<u>Code</u>	<u>Output</u>	<u>Definition</u>
C	EMI	Electromagnetic Interference (EMI).
E	ENVIRONMENT	Environment (salt, fog, humidity, etc.).
F	FUNCTIONAL	Functional test or use.
FC	CALIBRATION	Hangar or laboratory calibration.
L	LIFE TEST	Life test.
N	INSPECTION	Inspection (Not necessarily a preplanned inspection - could be casual observation.)
P	PRESSURE	Pressure.
Q	THERMAL VAC	Thermal vacuum.
R	STORAGE	Storage.
S	SHIPPING	Handling, packaging, shipping, transportation, or installation.
T	THERMAL	Thermal cycle or soak.
V	VIBRATION	Vibration.
X	ALERT	ALERT report.
ZZ	NO PROBLEM	Not a reportable problem.

TABLE B.2**DATABASE CODE TRANSLATION TABLES - Continued**

PRACA Code List for Failure Mode or Symptom (Element 27)

<u>Code</u>	<u>Output</u>	<u>Definition</u>
EA	FAILS OFF	Obsolete code for JSC problems after 1981.
EAF	FAILS OFF	Fails off.
EAN	OUTPUT LOSS	No output.
EB	FAILS ON	Fails on.
EC	PREMATURE	Premature or inadvertent output (operation) or shutdown.
ED	DELAYED	Delayed output (operation) or shutdown.
EED	ERRATIC DATA	Output data values erratic.
EE	RANDOM	Random output (no apparent pattern).
EES	ERRATIC OP	Output signal erratic due to improper switch operation.
EF	INTERMITTENT	Intermittent output (proper output at times).
EG	SIG HI OR LO	Signal level HI or LO, or zero-level shift.
EH	BIT ERROR	Digital data error.
EI	HALT/INTRPT	Computer halt/interrupt.
EJ	WAVEFORM	Waveform or bias incorrect (EJ sub-codes available).
EJB	BANDWIDTH	Bandwidth too broad or too narrow.
EJN	ISOLATION	Electrical signal to noise rejection low/signal to noise rejection.
EJR	RADIAT PAT	Antenna radiation pattern error.
EJV	VSWR	VSWR out of spec, impedance mismatch, return signal loss.
EK	OUT-OF-PHASE	Out-of-phase.
EKS	SYNC LOSS	Loss of electrical signal lock/synchronization.
EL	SHORT	Short, low resistance, low voltage, high current, dielectric withstanding voltage (HIPOT), insulation resistance.
EM	ELECT LEAK	Arcing, corona, or static discharge.
EMI	EMI	EMI condition.
EN	OPEN	Open, high resistance, high voltage, or low current.
EQ	OUTPUT ERROR	Output present but not correct (no more specific category is applicable).
ET	MEAS ANOMALY	Measurement anomaly (a more detailed code is used by Orbiter).
EV	NOT-TO-SPEC	Not to spec (used by MSFC only).
EVA	VEL LIMIT	Velocity data out of spec.
EVB	RES LIMIT	Resolver data out of spec limits.
EVC	AXIS ALIGN	Gyro/accelerometer axis alignment accuracy/drift error.
EVD	BIAS DRIFT	Gyro/accelerometer bias out of spec/drift/shift.
EVE	SCALE FACTOR	Gyro/accelerometer scale factor out of spec/drift/shift.

TABLE B.2**DATABASE CODE TRANSLATION TABLES - Continued**

PRACA Code List for Failure Mode or Symptom (Element 27)

<u>Code</u>	<u>Output</u>	<u>Definition</u>
EVF	SLEW ERROR	Timing/position failure/error in slewing/torquing inertial platform.
EVG	ANGLE ERROR	Inertial platform gimbal angle out of spec/driftng.
EVH	PARAMET DEV	Parameter deviation in excess of 1- or 3-sigma spec limits.
EVJ	BITE IND	Built-in test equipment indicates hardware failure.
EVK	BITE ERROR	Failure in bite circuit (bite on bite).
EVL	FAILURE ID	Failure ID flag indicating instrumentation failed (used by MSFC only).
EVM	CON/MEG FAIL	Continuity/megger failure (used by MSFC only).
EVN	SERV/INT/MIS	Servo interrupt/miscompare (used by MSFC only).
EVP	ELEC TOLRNCE	Out of tolerance (functional).
MA	FAILS OFF	Fails to start.
MB	FAILS ON	Fails to stop.
MC	PREMATURE	Premature, fast, premature cutoff, or inadvertent operation.
MD	DELAYED	Delayed or slow operation.
ME	RANDOM	Random.
MF	INTERMITTENT	Intermittent.
MM	BIND OR JAM	Obsolete JSC code for problems after 1981.
MMB	BIND OR JAM	Binding, jamming, or seizing (includes undesired stiction).
MMR	RUB/FRET	Rubbing or fretting.
MO	VIBRATION	Vibration (used by MSFC only).
MP	FAILS OPEN	Fails open or fails to close (or retract) completely.
MQ	FAILS CLOSED	Fails closed or fails to open (or extend) completely.
MR	TORQUE HI/LO	Output torque high or low.
MS	STRUCT	Structure failure.
MSI	INSULATION	Thermal protection loss, inadequate insulation.
MT	P/T HI OR LO	Temp or pressure high or low.
MU	MECH TOLRNCE	Out of tolerance (functional).
MV	EXT LEAK	External leakage.
MW	INT LEAK	Internal leakage.
MX	FLOW ANOM	Flow or thrusts anomalies.
MXC	FLOW ANOM-CV	Flow anomaly - cavitation.
UC	UNSAT	Unsatisfactory condition.
ZZ	NO PROBLEM	Not a reportable problem.
ZD	DUPLICATE	This problem is a duplicate.
M9	OP BIND/JAM	Obsolete JSC code for problems after 1981.
E4	OUTPUT ERROR	Obsolete JSC code for problems after 1981.

TABLE B.2

DATABASE CODE TRANSLATION TABLES - Continued

PRACA Code List for Failure Mode or Symptom (Element 27)

<u>Code</u>	<u>Output</u>	<u>Definition</u>
E6	OUTPUT LOSS	Obsolete JSC code for problems after 1981.
E7	ELEC'L LOSS	Obsolete JSC code for problems after 1981.
E8	EMI OR EMR	Obsolete JSC code for problems after 1981.

NOTE: E prefix designates failure in an electrical mode.
M prefix designates failure in a mechanical mode.

TABLE B.2
DATABASE CODE TRANSLATION TABLES - Continued

PRACA Code List for Defect (Element 29A)

<u>Code</u>	<u>Output</u>	<u>Definition</u>
CE	EXTRA	Detail item or part extraneous, where not required.
CN	CONTAM	Contaminated, dirty or wet; inclusion in material; discolorization.
CR	CORROD	Corroded, oxidized, pitted, or rusted.
CX	VOID	Material includes bubbles, holes, or voids; or porosity excessive.
DA	ROUGH	Damaged surface - Abraded, chipped, dinged, gouged, nicked, roughed, scratched, or burrs.
DB	BENT	Damaged shape - Bent, buckled, crimped, collapsed, crushed, deformed, expanded, shrunk or twisted, or overstressed.
DC	BROKEN	Damaged structure - Broken, burst, cracked, cut, fractured, punctured, ruptured, shattered, split, or torn.
DD	DETACH	Damaged - Material delaminated, detached, flaking, loose, peeling, or separated.
EM	ELADJ	Electrically misadjusted, misaligned, miscalibrated, or mismatched.
EP	EL VAL	Electrical value of item or EEE part found to be inappropriate or incorrect.
ER	EL PIN	(Pin) protruding or recessed.
ES	ELSTRS	Electrically overstressed.
ET	ESD	Damaged by Electrostatic Discharge (ESD).
HD	OVRHTD	Damaged - Burnt, melted, overheated, or scorched.
HS	TEMTEN	Temperature sensitivity affecting function - no more specific classification applies.
MA	ME ADJ	Mechanically misadjusted, misaligned, mispositioned - if not torque or misfit.
MB	TORQUE	Improper torque for threaded assembly.
MC	MISFIT	Clearance excessive or insufficient; structural misfit, mismatched.
MD	M SIZE	Material dimension or weight excessive or insufficient - if not misfit or worn.
ME	WORN	Damaged by erosion, friction, or wear.
ML	AGED	Degraded by age, radiation, or rot; life limit exceeded.
MM	MISSIN	Material, part, or software missing or omitted (oversight in assembly).
MT	TYPE W	Material, part type, or software inappropriate, incorrect, or mislabeled; wrong part specified or used.
MU	STRESS	Material overstressed/overpressurized (no true defect identified).
MW	MISWIR	Miswired or misrouted.
PZ	EEE	EEE part defect.

TABLE B.2
DATABASE CODE TRANSLATION TABLES - Continued

PRACA Code List for Defect (Element 29A)

<u>Code</u>	<u>Output</u>	<u>Definition</u>
PA	ELECLK	Electrical leakage.
PB	HERGRS	Failure of gross hermetic leakage test.
PC	HERFIN	Failure of fine hermetic leakage test.
PE	VOID	Void, hole, hillock.
PF	MIGRTN	Migration of metal in EEE part.
PG	IMG	Intermetallic growth, "purple plague".
PK	PRTCLE	EEE part contaminated with internal particles.
PL	CHEM	EEE part material chemically contaminated internally/externally.
PP	TEMP	Incorrect temperature associated with EEE part process (curing, etc.).
PQ	TIME	Incorrect time associated with EEE part process (curing, etc.).
PR	WRONG	Wrong EEE part used.
PS	OPEN	Open in EEE part circuitry.
PT	SHORT	Short in EEE part internal circuitry.
PU	SMEAR	Material in EEE part smeared.
PX	PRT OK	Problem unconfirmed, part check out OK.
PW	DIMEN	Dimension in EEE part incorrect/wrong size/thick/thin/protruding/recessed.
XA	NOFA	No failure analysis performed at all.
XB	NOFAP	No failure analysis performed on parts.
XN	NA	No defect applicable.
XU	UNK	Defect unknown - Unexplained anomaly.
ZZ	ZZ	Not a reportable problem.

TABLE B.2

DATABASE CODE TRANSLATION TABLES - Continued

PRACA Code List for Material (Element 30B)

<u>Code</u>	<u>Output</u>	<u>Definition</u>
A	CIRC'T	Electrical circuit element(s) - No more specific classification applies.
B	CIRCB	Electrical circuit board - No more specific classification applies.
C	EEE	EEE part - capacitor, connector, transistor, diode, integrated circuit, resistor, relay, etc. (FSCN Group 59) - No more specific classification applies.
CA	DEVICE	Defect in EEE part subcomponent or structure - no lower classification possible.
CB	EXT LD	Defect in EEE part external lead.
CC	PACKG	Defect in EEE part case/package.
CD	METAL	Defect in EEE part metallization.
CE	COAT'G	Defect in EEE part passivation or glassification coating.
CF	DRESS	Defect in EEE part bond wire dressing.
CG	WIRE	Defect in EEE part internal wire (not bondwire).
CH	CONTCT	Defect in EEE part relay/switch contacts/circuit breaker/potentiometer contacts/wiper.
CJ	PROCSS	Defect in EEE part manufacturing process.
CK	EPOXY	Defect in epoxy material in EEE part (not die attach).
CL	DI ATT	Defect in bonding EEE part die.
CN	SPRING	Defect in spring within EEE part.
CP	BD PAD	Defect in EEE part internal wire bonding pad.
CQ	MARK'G	Defect in EEE part marking/labeling.
CR	BEAR'G	Defect in bearing/rotor/pivot.
CS	ELECND	Electrically conducting pin, socket (connector) or terminal, see 'E' for JSC.
CT	CRIMP	Defect in crimp (electrical terminations/thermal compression bond).
D	DIE	Active or passive element of an electronic circuit device.
E	EL C/W	Electrical conductor - Circuit breaker, switch contacts, or wipers; connector pin, part lead, or wire, JSC - Electrically conducting connector pin (wire), socket, terminal, or filament.
F	INSUL	Encapsulation, insulation, conformable coating, or potting.
G	SOLDER	Solder.
H	WELD	Braze or weld or metallurgical bond.
J	FINISH	Finish, lacquer, paint, or plating.
K	BOND	Adhesive, chemical bond, or lamination.
L	FASTNR	Fastener - Bolt, nut, cotter pin, rivet, screw tie-down, etc.

TABLE B.2

DATABASE CODE TRANSLATION TABLES - Continued

PRACA Code List for Material (Element 30B) - Concluded

<u>Code</u>	<u>Output</u>	<u>Definition</u>
M	LINK'G	Mechanism; hydraulic or mechanical drive linkage element(s) - No more specific classification applies.
N	HOLE	Hole, nozzle, orifice, or vent; poppet.
P	SEAL	Diaphragm; gasket, o-ring, or seal.
Q	LUBE	Grease, lubricant, or oil.
R	FLUID	Fluid - Gas or liquid, but not lube.
S	STRUCT	Structural element(s) or material - No more specific classification applies.
T	S'STRT	Substrate material - No more specific classification applies.
W	RMEDIA	Magnetic or optical recording media.
X	S'WARE	Software or firmware algorithm - No hardware detail applies.
XU	UNK	Material unknown - Unexplained anomaly.
Y	OPER'N	Manner or mode of operation or use - No detail applicable.
Z	N/A	No material defect applies.
ZZ	ZZ	Not a reportable problem.

TABLE B.2
DATABASE CODE TRANSLATION TABLES - Continued

PRACA Code List for Cause (Element 18)

<u>Code</u>	<u>Output</u>	<u>Definition</u>
D	DESIGN	Design - When no more specific sub-code applies.
DH	DES-HDW	-Hardware design.
DHA	DES-HDW-AGE	-Age (time, shelf-life).
DHC	DES-HDW-LIFE	-Life (cycle, operating time).
DHE	DES-HDW-ENVR	-Hardware design environment (chemical or physical) JSC (physical) only.
DHF	DES-HDW-FLOW	-Operational flow.
DHH	DES-HDW-HFAT	-High cycle fatigue.
DHL	DES-HDW-LFAT	-Low cycle fatigue.
DHM	DES-HDW-CHEM	-Operational chemical environment.
DHO	DES-HDW-LOAD	-Overstress/loads (not Externally Induced [EI]).
DHP	DES-HDW-INST	-Hardware design instructions, planning or procedures - Obsolete code for JSC problems after 1981.
DHT	DES-HDW-THRM	-Operational thermal environment.
DHV	DES-HDW-VIBR	-Operational vibration.
DHW	DES-HDW-WORK	-Hardware design workmanship - Obsolete code for JSC problems after 1981.
DS	DES-SFT	Software design.
E	INDUCED	EI.
EIC	EI-CONTAM	Contamination (includes induced).
EOE	EMI	EMI.
ES	EI-SHIP	Induced by shipping, transporting, storage (packaging) or handling.
ESE	EI-SHIP-ENVR	-Environment (chemical or physical).
ESP	EI-SHIP-INST	-Instructions, planning, or procedures.
EST	EI-SHIP-EQUP	-Equipment or tooling.
ESW	EI-SHIP-WORK	-Workmanship (includes unauthorized work).
ET	EI-TEST	Induced by test/use (formal ATP, QUAL, and subsequent).
ETE	EI-TEST-ENVR	-Environment (chemical or physical) (not contamination).
ETP	EI-TEST-INST	-Instructions, planning, inspection, or procedures.
ETT	EI-TEST-EQUP	-Equipment or tooling (includes GSE).
ETW	EI-TEST-WORK	-Workmanship (includes unauthorized work).
M	MANUF'G	Manufacturing - When no more specific subcode applies.
MA	MFG-ASY	-Manufacturing assembly or fabrication.
MAE	MFG-ASY-ENVR	-Environment (chemical or physical).
MAP	MFG-ASY-INST	-Instructions, planning, or procedures.
MAT	MFG-ASY-EQUP	-Equipment or tooling.

TABLE B.2
DATABASE CODE TRANSLATION TABLES - Continued

PRACA Code List for Cause (Element 18) - Concluded

Code	Output	Definition
MAW	MFG-ASY-WORK	-Workmanship (includes unauthorized work).
MM	MFG-MOV	-Manufacturing moving or transportation (handling).
MME	MFG-MOV-ENVR	-Environment (chemical or physical).
MMP	MFG-MOV-INST	-Instructions, planning, or procedures.
MMT	MFG-MOV-EQUP	-Equipment or tooling.
MMW	MFG-MOV-WORK	-Workmanship (includes unauthorized work).
MN	MFG-ISP	-Manufacturing inspection.
MNE	MFG-ISP-ENVR	-Environment (chemical or physical).
MNP	MFG-ISP-INST	-Instructions, planning, or procedures.
MNT	MFG-ISP-EQUP	-Equipment or tooling.
MNW	MFG-ISP-WORK	-Workmanship (includes unauthorized work).
MP	MFG-PRC	-Manufacturing process (except assembly, inspection, and test).
MPE	MFG-PRC-ENVR	-Environment (chemical or physical).
MPP	MFG-PRC-INST	-Instructions, planning, or procedures.
MPT	MFG-PRC-EQUP	-Equipment or tooling.
MPW	MFG-PRC-WORK	-Workmanship (includes unauthorized work).
MT	MFG-TST	-Manufacturing test (pre-ATP).
MTE	MFG-TST-ENVR	-Environment (chemical or physical).
MTP	MFG-TST-INST	-Instructions, planning, or procedures.
MTT	MFG-TST-EQUP	-Equipment or tooling.
MTW	MFG-TST-WORK	-Workmanship (includes unauthorized work).
S	SOFTWARE	
U	UNKNOWN	Cause unknown - Obsolete code for JSC problems after 1981.
UA	UNK-ONE	One time anomaly - Obsolete code for JSC problems after 1981.
UU	UNK-UND	Unknown/undetermined (JSC only) - Obsolete code for problems after 1981.
UF	UA-FLIGHT	Unexplained anomaly in flight hardware.
UN	UA NONFLIGHT	Unexplained anomaly in nonflight/downgraded hardware.
UK	UNK-NO-INV	Failure analysis/investigation not performed.
Z	NONE	Problem reported in error.
ZD	DUPLICATE	This problem is a duplicate.
ZZ	NO PROBLEM	Not a reportable problem.

TABLE B.2

DATABASE CODE TRANSLATION TABLES - Continued

PRACA Code List for Recurrence Control (Element 31)

<u>Code</u>	<u>Output</u>	<u>Definition</u>
0	EXPL	Explanation rather than corrective action, or no corrective action planned for all vehicles or flights. If no corrective action, use no additional code.
1	DES	Design change (engineering order release, drawing change, software change, site mandatory retrofit, mod by attrition, etc.).
2	MFG	Manufacturing method, procedure, or process changed.
3	F/TE	Facility, test, or inspection equipment changed.
4	TEST	Test, operating, or inspection procedure changed.
5	TRNG	Training or certification of personnel changed.
6	MNTN	Maintenance changed (other than a change in time or cycle use limit, includes storage).
7	LT/C	Limit time or cycle use of component.
8	SHIP	Packaging, shipping or transportation changed.
9	GSE	GSE changed.
A	PURG	Parts/components purged from inventory.
B	WAIV	None - Waiver.

TABLE B.2

DATABASE CODE TRANSLATION TABLES - Concluded

PRACA Code List for Related Documents (Element 19A)

<u>Code</u>	<u>Output</u>	<u>Definition</u>
AS	ATP-SCREEN	Ref-no is prior ATP-screenable problem like Report - no problem.
A1	ALERT RECVD	ALERT through which the problem was identified.
A2	ALERT SENT	ALERT issued because of this problem.
BX	HEN REPORT	This problem resolved based on problem, Ref-no, of same type JSC - This report documents resolution of problem Ref-no.
C	CIL REF	The initial CIL reference relating to this problem.
CX	CHICK RPT	This report documents resolution of problem Ref-no JSC - Problem resolved based on problem, Ref-no of same type.
EC	CR/ECP/RECP	Change record.
HA	HAZARD RPT	Hazard report cross reference: Use only if no FMEA number exists.
LC	LGC CHN NUM	Logic change number.
MR	MAT REV BRD	MRB directive.
NC	PROB RPT	Initial nonconformance PR.
RE	CROSS-E	Ref-no problem is cross-explained to this problem.
WA	WAIVER	Waiver to SSP requirements not specified by other code.
WC	WAIVER, CIL	Waiver to SSP CIL requirements.
WD	WAD	Work Authorization Document.
WM	WAIVER, OMRSD	Waiver to SSP OMRSD requirements.
XM	EXCEPTION	Exception to SSP OMRSD requirements.
ZA	C/O REVIEW	Closeout received for coordination.
ZB	C/O REJECT	Closeout rejected.
ZZ	PV-FCP	PDS RPT verified - Film cartridge page.

NOTE: The MSFC and JSC PRACA databases may contain additional codes/data not listed above. The element project PRACA offices should be contacted for interpretation of this data.

APPENDIX C

GLOSSARY OF TERMS

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APPENDIX C

GLOSSARY OF TERMS

Acceptance Testing. Tests to determine that a part, component, subsystem, or system is capable of meeting performance requirements prescribed in purchase specifications or other documents specifying what constitutes the adequate performance capability for the item in question.

Anomaly. An unexpected event, hardware or software damage, a departure from established procedures or performance, or a deviation of system, subsystem, and/or hardware or software performance outside certified design/performance specification limits.

Certification Testing. Qualification tests, major ground tests, other tests, and analysis used to determine that the design and manufacturing process of hardware from the component level to the subsystem level meets requirements.

Closed Problem. A problem which the design element has approved as resolved based on the determination of the cause(s) or probable cause(s) and flight rationale, and the definition of the remedial or corrective action, or that no remedial or corrective action is required (with supporting rationale).

Contractor Furnished Equipment. Hardware provided under a Space Shuttle element end-item hardware contract.

Corrective Action. Action (beyond remedial action) to correct a problem and prevent/control problem recurrence in existing and/or future hardware or software. Corrective action is approved by the appropriate Design Element Office and includes one or more of the following:

- a. Design change
- b. Manufacturing method/procedure/process change
- c. Test or operating procedure change
- d. Training or certification of personnel
- e. Maintenance procedure change
- f. Limit time or cycle of component
- g. Transportation or shipping change

Critical Items List. A list meeting the requirements of NSTS 22206 for critical items.

Criticality Categories for Hardware Problems. Refer to NSTS 22206 for criticality categories.

Dispositioned Problem. A problem that has been closed or interim dispositioned.

Facility Handling Equipment. Ground-based equipment that interfaces with flight hardware or flight hardware interfacing GSE (i.e., lifting devices, crawler/transporter, trucks/trailers, handling fixtures, etc.).

Failure. The inability of a system, subsystem, component, or part to perform its specified function within specified limits, under specified conditions, and for a specified duration.

Failure Modes and Effects Analysis. A description of the manner in which an item can fail and the resulting effects on the system, interfacing system, mission, and crew/vehicle.

Flight-Like Hardware. Non-flight equipment inspected and tested to flight hardware specifications used in flight operating conditions and built with any combination of the following:

- a. Manufacturing processes which are identical to those used for flight equipment.
- b. Contains parts or assemblies identical in design to flight hardware.
- c. Equipment whose design is identical to flight equipment when the design is critical to functional performance.

Generic Problem. A problem that could exist on any or all components of like or similar design.

Government Furnished Equipment. The ancillary flight hardware (excluding the Orbiter, SSMEs, ETs, and SRBs) provided for the Space Shuttle. This includes pyrotechnic devices and equipment (space suits, camera systems, tools, clothing, food) primarily for crew provisioning and use.

Ground Support Equipment. Ground-based equipment functionally designed to support flight hardware servicing, checkout, test, movement, alignment, protection, or calibration.

In-Family. A reportable problem that was previously experienced, analyzed, and understood is an in-family problem. Manufacturing, processing, and operations within the experience base as program-accepted performance are defined as in-family. In-family problems are in compliance with established requirements and processes for the end

item or system. Activities to return to the design requirement or performance specification by removal and replacement or rework using a standard repair or maintenance procedure approved by the design project are in-family. Out of limits performance or discrepancies which have been previously experienced may be considered as in-family when specifically approved by the SSP or design project.

NOTE: Established program requirements include engineering drawings and specifications, engineering requirements, acceptance test requirements, NSTS 08171, LCC, NSTS 08151, Intermediate and Depot Maintenance Requirements Document (IDMRD), certification basis, and flight constraints and limits as modified by approved waivers and exceptions.

Interim Dispositioned Problem. A problem which the design element has approved as not constraining specified flights based on the criteria in Paragraph 4.3 .

Line-Replaceable Unit. An item which can be removed and replaced as a unit from a system at the organizational level of repair or the lowest assembly level listed in the FMEA.

Loss of Personnel Capability. Loss of personnel capability to perform normal or emergency operations; also includes loss or injury to public.

Loss of Vehicle System. Loss of the capability to provide the level of system performance required for normal or emergency operations.

NASA ALERT. A general term for Government/Industry Data Exchange Program (GIDEP) ALERTs, GIDEP problem advisories, GIDEP safety ALERTs, GIDEP agency action notices, NASA advisories, Office of Inspector General information requests, NASA TWX notifications, and NASA advance potential problem notifications sent out by NASA for the purpose of identification, notification, evaluation, and impact of actual or potential problems on nonconforming parts, components, materials, manufacturing processes, test equipment, construction materials, office equipment, chemicals, or computer software notification.

Nonconformance. A condition of any article or material in which one or more characteristics do not conform to requirements.

Normal Processing. Activity performed in accordance with approved procedures (i.e., WAD).

Out-of-Family. The Elements may develop unique applications of this definition with PRCB approval. Out-of-family conditions involve one or more of the following:

- a. Operation or performance outside the expected performance range for a given parameters or which has not previously been experienced.

- b. Anomalies or nonconformances which affect:
 - 1. Configuration
 - 2. Certification
 - 3. Mission success
 - 4. Safety critical functions
 - 5. Weight in excess of two pounds (equivalent performances to orbit)
- c. Adverse problem trends.
- d. Anomalies or nonconformances which require design element analysis or assistance for resolution.
- e. Unexplained anomalies or events.
- f. Limit hardware life.
- g. Restrict hardware or software use.
- h. Affect hazard control.
- i. Affect flight or ground operation procedures that are controlled by the government.
- j. Change software or hardware configuration that are controlled by the government.
- k. Allow use of hardware that does not meet performance specifications, exceeds certification limits, or surpasses time, age, or cycle life limits (waivers/exceptions).
- l. Affect critical hardware manufacture or repair processes.

Overstress. A value of any stress parameter in excess of the upper limit of the normal operating range or in excess of a rated value as defined in the procurement specification.

Probable Cause. The event or series of events occurring at the lowest level of assembly which failure investigation/analysis indicates is likely responsible for the problem.

Problem. Any nonconformance falling within the applicability of Section 3.1 Paragraphs 1 and 2 of this document.

Problem Cause. The event or series of events occurring at the lowest level of assembly which is directly responsible for the problem.

Problem Reporting and Corrective Action. A management system for identifying, reporting, analyzing for cause, remedying, and preventing recurrence of problems.

Process Catch. Problems found during normal processing (departure from procedure, such as a WAD), or problems found during inspection or surveillance sampling prior to or during closeout or test (includes “stumble-on” prior to closeout or test).

Process Escape. Any problem found after it should have been detected during normal processing. Escapes include problems found during surveillance sampling, inspection (including random), or audit after closeout or test. Also, if an assessment determines that the problem would not have been caught during closeout or test, the problem will be considered a process escape.

Qualification Testing. Tests conducted as part of certification to demonstrate that design and performance requirements can be met under specific conditions.

Remedial Action. Action taken to bring a specific failed unit to operational status or to eliminate an unsatisfactory condition on the specific unit; e.g., remove-and-replace, rework-to-print, MRB disposition, etc.

Reportable Problem. Any nonconformance or anomaly which meets the criteria defined in Section 3.1 Paragraphs 3 and 4 of this document.

Severity Categories for Software Problems.

<u>Severity</u>	<u>Potential Effect of Failure</u>
1	Code problem which causes loss of control, explosion, or other hazardous effect.
2	Code problem which causes inability to achieve mission objectives such as: launch, mission duration, payload deployment, etc.

Test, Teardown Evaluation. Testing, disassembly, and evaluation to confirm or determine the cause of a problem.

Unexplained Anomaly. An anomaly (ghost or phantom) which cannot be repeated or for which a cause cannot be determined.

Unsatisfactory Condition. Any nonconformance for which engineering resolution is required and which requires recurrence control beyond the specific article under question. Included in this definition are:

- a. Conditions, which cannot be, corrected to the specified configuration using standard repair procedures, excluding MRB “use-as-is” dispositions and non-unique MRB repair dispositions.
- b. An event which could lead to a failed condition but does not affect the function of the article such as contamination, corrosion, workmanship, etc.

Waiver/Deviation. Granted use or acceptance of an article which does not meet specified requirements. A waiver is given or authorized after the fact; a deviation is before the fact.